

REMARKS

The Office Action mailed December 4, 2002, has been received and its contents carefully noted. In order to advance prosecution, claim 9 has been amended and new claims 12-15 have been added to the Application as shown in the foregoing LISTING OF CLAIMS.

New claim 12 recites a limitation previously recited in independent claim 9.

New claims 13-15 present claims having a scope which differs from claims 9, 11, and 12.

Claims 9, 11, and 12-15 are now pending in the Application and are submitted to be in allowable condition. Claim 4 has been withdrawn as having been non-elected in responding to a restriction requirement and has been cancelled without prejudice to the filing of a Divisional Application directed thereto. Claims 1-3, 5-8, and 10 have been cancelled without prejudiced as well.

Claim 9 as amended includes the step:

"irradiating the layer of the mixture having a viscosity ranging from 500 cps to 10,000 cps either with light through a mask or directly with condensed light, to form a latent image in pattern form which includes irradiated areas and non-irradiated areas; ..."

This recitation indicates that the layer of the mixture at the time of irradiation to photocure the layer and form a latent image in pattern form has a viscosity, i.e., continues to be a liquid so that no intervening step of drying has taken place.

New independent claim 13 includes the step:

"irradiating the layer of the mixture while the layer is in liquid form and has a viscosity ranging from 500 cps to 10,000 cps, either with light through a mask or directly with condensed light, to form a latent image in pattern form which includes photocured irradiated areas and non-irradiated areas; ..."

Support for "liquid form" and "photocuring" is found in the specification as filed on page 16, lines 14-17, and page 16, line 24, through page 17, line 4. This recitation indicates that the layer of the mixture at the time of irradiation to photocure the layer and form a latent image in pattern form continues to be a liquid so that no intervening step of drying has taken place.

The rejection of claims 9 and 11 under 35 U.S.C. §103(a) as being unpatentably obvious over Fan et al. (EP 0446672) in view of Tsukamoto et al. (US 5,902,715), Watanabe et al. (US 6,218,281), and the Elliott excerpt, is respectfully traversed.

Applicants do not agree that the combined disclosures of Fan et al., Tsukamoto et al., Watanabe et al., and the Elliott excerpt set out a *prima facie* case of obviousness against claims 9 and 11 because the combined disclosures do not meet Applicants' claims.

Applicants submit that the inventive method is distinguishable as irradiating a layer of the mixture which has a viscosity ranging from 500 to 10,000 cps , i.e., is in liquid form at the time it is irradiated, which is neither disclosed in nor suggested by any reasonable combination of the teachings of the applied references.

In the present invention, the mixture which is spin-coated onto the under cladding layer is still in liquid form, i.e., still has a viscosity as prepared, at the start of the irradiating step to form a latent image because no drying or baking step is performed after Applicants' spin-coating step. In other words, the mixture is a liquid having a viscosity ranging from 500 to 10,000 cps at the start of the irradiating step (see claims 9 and 13).

Neither Fan et al., Tsukamoto et al., Watanabe et al., nor the Elliot excerpt disclose this feature and/or Applicants' claimed viscosity range. Applicants consider that irradiation of the mixture while in the liquid state is advantageous to obtain a more uniformly cured product with

superior properties to that obtained from such a mixture irradiated in the solid state. This feature is thus submitted to clearly differentiate the present invention as claimed from the prior art.

The primary reference, Fan et al., teaches **baking after applying** a photosensitive layer in order to drive off solvents **and before lithographic exposure** (see page 10, lines 40-53). Thus, in the method of Fan et al., it is submitted to be clear that the coated photosensitive layer is in the solid state during the lithographic exposure step unlike the method of the present invention.

Tsukamoto et al. teach **removing solvents** after a coating step **and before irradiation** to ultraviolet rays (see Col. 18, line 3 *et seq.*). Tsukamoto et al. additionally teach that removal of solvents can be carried out by leaving the coated film as is, by heating, or by decompression (see Col. 18, lines 14 and 15). By removing solvents from the coated film in the method of Tsukamoto et al., the coated film thus dried, i.e., changed from the liquid state to the solid state unlike the method of the present invention.

Moreover, when using the composition of Table 1 (see Col. 30) of Tsukamoto et al., the content of EHPE-3150 in the coated film is calculated to be 59% after removing the dichloromethane and tetrahydrofuran. Taking account of Table 1 on page 11 of the present specification, Applicants estimate that the viscosity of Tsukamoto et al.'s coated film would be over 10,000 cps which falls outside of the scope of Applicants' claims.

Watanabe et al. teach spin-coating of a photoresist liquid having a viscosity of 3,800 cps (see Col. 6, line 50 *et seq.*). The coated photoresist film is then **immediately cured** at a temperature of 100°C for 6 min **before exposure** to ultraviolet rays (see Col. 6, line 53 and 54). The preferred viscosity range in Watanabe et al. is given as 3,000 to 4,000 cps (see Col. 7, lines 1 and 2). Thus, the photoresist film of Watanabe et al. is in the solid state during the exposure step

as a result of the preceding curing step. Thus, clearly the viscosity of the photoresist film in the exposure step is not 3,800 cps.

The Elliott excerpt is relied upon by the Examiner as teaching spin coating techniques. Applicants submit, however, that the Elliott excerpt is not seem to supply the disclosure missing from the other references needed to construct a *prima facie* case of obviousness.

As stated above, contrary to the method of the present invention, none of the references in the Examiner's combination of references teach or suggest a method in which a coated photosensitive film is in the liquid state during an irradiation (exposure) step.

Accordingly, Applicants submit that the Examiner's combination of references may not be fairly said to teach or suggest the method of the present invention or the advantage achieved by Applicants' method of providing a more uniformly cured product, i.e., the core of the waveguide so that this ground of rejection should be withdrawn.

In view of the foregoing amendments and remarks, it is requested that the rejections of record be reconsidered and withdrawn, that claims 9 and 11 as amended, and new claim 12 be allowed, and that the Application be found to be in allowable condition.

Should the Examiner not find the Application to be in allowable condition or believe that a conference would be of value in expediting the prosecution of the Application, Applicants request that the Examiner telephone undersigned Counsel to discuss the case and afford Applicants an opportunity to submit any Supplemental Amendment that might advance

prosecution and place the Application in allowable condition.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Ashley J. Wells", written over a horizontal line.

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DC2-DOCS1-438116